

## Decimal Equivalents

### Inch and Millimeters

Inch Fraction	Inch Decimal	Millimeters	Inch Fraction	Inch Decimal	Millimeters	Inch Fraction	Inch Decimal	Millimeters
1/64 =	.015625	0.397	23/64 =	.359375	9.13	11/16 =	.6875	17.46
1/32 =	.03125	0.79	3/8 =	.375	9.52	45/64 =	.703125	17.86
3/64 =	.046875	1.19	25/64 =	.390625	9.92	23/32 =	.71875	18.26
1/16 =	.0625	1.59	13/32 =	.40625	10.32	47/64 =	.734375	18.65
5/64 =	.078125	1.98	27/64 =	.421895	10.72	3/4 =	.75	19.05
3/32 =	.09375	2.38	7/16 =	.4375	11.11	49/64 =	.765625	19.45
7/64 =	.109375	2.77	29/64 =	.453125	11.51	25/32 =	.78125	19.84
1/8 =	.125	3.17	15/32 =	.46875	11.91	51/64 =	.796875	20.24
9/64 =	.140625	3.57	31/64 =	.484375	12.30	13/16 =	.8125	20.64
5/32 =	.15625	3.97	1/2 =	.5	12.7	53/64 =	.828125	21.03
11/64 =	.171875	4.37	33/64 =	.515625	13.1	27/32 =	.84375	21.43
3/16 =	.1875	4.76	17/32 =	.53125	13.49	55/64 =	.859375	21.83
13/64 =	.203125	5.16	35/65 =	.546875	13.89	7/8 =	.875	22.22
7/32 =	.21875	5.56	9/16 =	.5625	14.29	57/64 =	.921875	22.62
15/64 =	.234375	5.95	37/64 =	.578125	14.68	29/32 =	.90625	23.02
1/4 =	.25	6.35	19/32 =	.59375	15.08	59/64 =	.921875	23.41
17/64 =	.26875	6.75	39/64 =	.609375	15.48	15/16 =	.9375	23.81
9/32 =	.28125	7.14	5/8 =	.625	15.87	61/64 =	.953125	24.21
19/64 =	.296875	7.54	41/64 =	.640625	16.27	31/32 =	.96875	24.61
5/16 =	.3125	7.94	21/32 =	.65625	16.7	63/64 =	.984375	25.0
21/64 =	.328125	8.33	43/64 =	.671875	17.06	1 =	1.0	25.4
11/32 =	.34375	8.73						

## Grooved Trolley Wire

### Values for Weight, Strength and Resistance

Size A.W.G.	Actual Area Circular Mills	Diameter Inches	Weight Pounds per 1000 Ft. All Kinds	D.C. Resistance OHMs per 1000 feet, 20° C. (68°F)				Breaking Load, Pounds			
				Copper Hard Drawn	Bronze High Strength	Bronze Medium Strength	Bronze High Conductivity	Copper Hard Drawn	Bronze High Strength	Bronze Medium Strength	Bronze High Conductivity
350000	351200	.620	1063	.0304	.0738	.0454	.0369	11800	17240	15500	16410
300000	299800	.574	907.6	.0358	.0865	.0532	.0432	10410	15620	13610	14480
4/0	212000	.482	642	.0507	.1223	.0753	.0611	7759	11490	10160	10820
3/0	167300	.430	506	.0638	.1549	.0954	.0775	6373	9329	8278	8804
2/0	137900	.392	418	.0774	.1880	.1157	.0940	5437	7906	7040	7473

## Round Trolley Wire

### Values for Weight, Strength and Resistance

4/0	211600	.460	641	.0504	.1225	.0754	.0613	8143	11470	10140	10800
3/0	168100	.410	508	.0636	.1542	.0949	.0771	6734	9374	8318	8844
2/0	133200	.365	403	.0802	.1947	.1198	.0973	5524	7638	6801	7217

Coefficient of linear expansion .0000094 per degree F.  
 Final Modulus of elasticity 16,000,000 pounds per square inch.  
 Density, 8.89 gm. per cu. or 0.3212 pounds per cubic inch at 20°C.  
 Class A - 40 per cent conductivity I.A.C.S.  
 Class B - 65 per cent conductivity I.A.C.S.  
 Class C - 80 per cent conductivity I.A.C.S.  
 Based on Tentative Standards of A.T.A. for Hard Drawn Copper and Bronze Trolley Wires.

## *Elevation of Outer Rail on Curves*

Degree of Curves	Velocity in Miles per Hour											
	10	15	20	25	30	35	40	45	50	55	60	65
0° 30	1/16	1/16	1/8	3/16	5/16	3/8	1/2	11/16	13/16	1	1 3/16	1 3/8
1°	1/16	1/8	1/4	7/16	9/16	13/16	1 1/16	1 5/16	1 5/8	2	2 3/8	2 13/16
1° 30	1/8	1/4	3/8	5/8	7/8	1 3/16	1 9/16	2	2 1/2	3	3 9/16	4 3/16
2°	1/8	5/16	1/2	13/16	1 3/16	1 5/8	2 1/8	2 11/16	3 5/16	4	4 3/4	5 9/16
2° 30	3/16	3/8	11/16	1	1 1/2	2	2 5/8	3 5/16	4 1/8	5	5 15/16	6 15/16
3°	3/16	7/16	13/16	1 1/4	1 3/4	2 7/16	3 3/16	4	4 15/16	6	7 1/8	8 3/8
3° 30	1/4	1/2	15/16	1 7/16	2 1/16	2 13/16	3 11/16	4 11/16	5 3/4	7	8 5/16	
4°	1/4	9/16	1 1/16	1 5/8	2 3/8	3 1/4	4 1/4	5 5/16	6 5/8	8	9 1/2	
4° 30	5/16	11/16	1 3/16	1 7/8	2 11/16	3 5/8	4 3/4	6	7 7/16	9		
5°	5/16	3/4	15/16	2 1/16	2 15/16	4 1/16	5 1/4	6 11/16	8 1/4	10		
5° 30	3/8	13/16	1 7/16	2 1/4	3 1/4	4 7/16	5 13/16	7 3/8	9 1/16			
6°	3/8	7/8	1 9/16	2 1/2	3 9/16	4 7/8	6 5/16	8	9 7/8			
6° 30	7/16	15/16	1 11/16	2 11/16	3 7/8	5 1/4	6 7/8	8 11/16				
7°	7/16	1 1/16	1 7/8	2 7/8	4 1/8	5 5/8	7 3/8	9 3/8				
7° 30	1/2	1 1/8	2	3 1/16	4 7/16	6 1/16	7 15/16					
8°	1/2	1 3/16	1 2/8	3 5/16	4 3/4	6 7/16	8 7/16					
8° 30	9/16	1 1/4	2 1/4	3 1/2	5 1/16	6 7/8	9					
9°	9/16	1 5/16	2 3/8	3 11/16	5 5/16	7 1/4	9 1/2					
9° 30	5/8	1 7/16	2 1/2	3 15/16	5 5/8	7 11/16						
10°	11/16	1 1/2	2 5/8	4 1/8	5 15/16	8 1/16						
10° 30	11/16	1 9/16	2 3/4	4 5/16	6 1/4	8 1/2						
11°	3/4	1 5/8	2 7/8	4 9/16	6 5/16	8 7/8						
11° 30	3/4	1 11/16	3 1/16	4 3/4	6 13/16	9 5/16						

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## Elevation of Outer Rail on Curves

Degree of Curves	Velocity in Miles per Hour											
	10	15	20	25	30	35	40	45	50	55	60	65
12°	13/16	1 3/4	3 3/16	4 15/16	7 1/8	9 11/16						
12° 30	7/8	1 7/8	3 5/16	5 1/8	7 7/16							
13°	7/8	1 15/16	3 7/16	5 3/8	7 11/16							
13° 30	15/16	2	3 9/16	5 9/16	8							
14°	15/16	2 1/16	3 11/16	5 3/4	8 5/16							
14° 30	15/16	2 1/8	3 13/16	6	8 5/8							
15°	1	2 1/4	3 15/16	6 3/16	8 7/8							
16°	1 1/16	2 3/8	4 3/16	6 9/16	9 7/16							
17°	1 1/8	2 1/2	4 7/16	7								
18°	1 3/16	2 5/8	4 3/4	7 3/8								
19°	1 1/4	2 13/16	5	7 13/16								
10° 30	11/16	1 9/16	2 3/4	4 5/16	6 1/4	8 1/2						

Best to reduce speed on curves to conform to quantities above heavy lines.

$$\text{Elevation in inches} = \frac{12 \times 4.71 \times V^2}{32.2R}$$

V = Velocity in feet per second.  
 R = Radius of curve in feet.  
 Standard guage = 4.71 feet.

## Areas and Circumferences of Circles

Diameter Inches	Circumferences Inches	Area Square Inches	Diameter Inches	Circumferences Inches	Area Square Inches
1/64	.049087	0.00019	1. 11/16	5.30144	2.2365
1/32	.098175	0.00077	3/4	5.49779	2.4053
3/64	.147262	0.00173	13/16	5.69414	2.5802
1/16	.196350	0.00307	7/8	5.89049	2.7612
3/32	.294524	0.00690	15/16	6.08684	2.9483
1/8	.392699	0.01227	2.	6.28319	3.1416
5/32	.490874	0.01917	1/16	6.47953	3.3410
3/16	.589049	0.02761	1/8	6.67588	3.5466
7/32	.687223	0.03758	3/16	6.87223	3.7583
1/4	.785398	0.04909	1/4	7.06858	3.9761
9/32	.883573	0.06213	5/16	7.26493	4.2000
5/16	.981748	0.07670	3/8	7.46128	4.4301
11/32	1.07992	0.09281	7/16	7.65763	4.6664
3/8	1.17810	0.11405	1/2	7.85398	4.9087
13/32	1.27627	0.12962	9/16	8.05033	5.5172
7/16	1.37445	0.15033	5/8	8.24668	5.4119
15/32	1.47262	0.17257	11/16	8.44303	5.6727
1/2	1.57080	0.19635	3/4	8.63938	5.9396
17/32	1.66897	0.22166	13/16	8.83573	6.2126
9/16	1.76715	0.24850	7/8	9.03208	6.4918
19/32	1.86532	0.27688	15/16	9.22843	6.7771
5/8	1.96350	0.30680	3.	9.42478	7.0686
21/32	2.06167	0.33824	1/16	9.62113	7.3662
11/16	2.15984	0.37122	1/8	9.81748	7.6699
23/32	2.25802	0.40574	3/16	10.0138	7.9798
3/4	2.35619	0.44179	1/4	10.2102	8.2958
25/32	2.45437	0.47937	5/16	10.4065	8.6179
13/16	2.55254	0.51849	3/8	10.6029	8.9462
27/32	2.65072	0.55914	7/16	10.7992	9.2806
7/8	2.74889	0.60132	1/2	10.9956	9.6211
29/32	2.84707	0.64504	9/16	11.1919	9.9678
15/16	2.94524	0.69029	5/8	11.3883	10.321
31/32	3.04342	0.73708	11/16	11.5846	10.680
1.	3.14159	0.78540	3/4	11.7810	11.045
1/16	3.33794	0.88664	13/16	11.9773	11.416
1/8	3.53429	0.99402	7/8	12.1737	11.793
3/16	3.73064	1.1075	15/16	12.3700	12.177
1/4	3.92699	1.2272	4.	12.5564	12.566
5/16	4.12334	1.3530	1/16	12.7627	12.962
3/8	4.31969	1.4849	1/8	12.9611	13.364
7/16	4.51064	1.6230	3/16	13.1554	13.722
1/2	4.71239	1.7671	1/4	13.3518	14.186
9/16	4.90874	1.9175	5/16	13.5481	14.607
5/8	5.10509	2.0739	3/8	13.7445	15.033

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## Areas and Circumferences of Circles

Diameter Inches	Circumferences Inches	Area Square Inches	Diameter Inches	Circumferences Inches	Area Square Inches
7/16	13.9408	15.466	3/8	20.0277	31.919
1/2	14.1372	15.904	1/2	20.4204	33.183
9/16	14.3335	16.349	5/8	20.8131	34.472
5/8	14.5299	16.800	3/4	21.2058	35.785
11/16	14.7262	17.257	7/8	21.5984	37.122
3/4	14.9226	17.721	7.	21.9911	38.485
13/16	15.1189	18.190	1/8	22.3838	39.871
7/8	15.3153	18.665	1/4	22.7765	41.282
15/16	15.5116	19.147	3/8	23.1692	42.718
5.	15.7080	19.635	1/2	23.5619	44.179
1/16	15.9043	20.129	5/8	23.9546	45.664
1/8	16.1007	20.629	3/4	24.3473	47.173
3/16	16.2970	21.135	7/8	24.7400	48.707
1/4	16.4934	21.648	8.	25.1327	50.265
5/16	16.6897	22.166	1/8	25.5254	51.849
3/8	16.8861	22.691	1/4	25.9181	53.456
7/16	17.0824	23.221	3/8	26.3108	55.088
1/2	17.2788	23.758	1/2	26.7035	56.745
9/16	17.4751	24.301	5/8	27.0962	58.426
5/8	17.6715	24.850	3/4	27.4889	60.132
11/16	17.8678	25.406	7/8	27.8816	61.862
3/4	18.0642	25.967	9.	28.2743	63.617
13/16	18.2605	26.535	1/8	28.6670	65.397
7/8	18.4569	27.109	1/4	29.0597	67.201
15/16	18.6532	27.688	3/8	29.4524	69.029
6.	18.8496	28.274	1/2	29.8451	70.882
1/8	19.2423	29.465	5/8	30.2378	72.760
1/4	19.635	30.680	3/4	30.6305	74.662

## Solid Copper Wire - Bare and Insulated

Size A.W.G.	Section Area			Diameter Overall		Weight Pounds per 1000 feet			
	Circular Mils	Square Inches	Square Millimeter	Bare	Weatherproof (minmium)	Bare	T.B.W.	Hard Drawn	Annealed
0000	211600	.1662	107	.4600	.6163	641	767	8143	5320
000	167800	.1318	85.0	.4096	.5659	508	629	6722	4220
00	133100	.1045	67.4	.3648	.5211	403	502	5519	3340
0	105500	.08289	53.5	.3249	.4812	320	407	4517	2650
1	83690	.06573	42.4	.2893	.4456	253	316	3688	2100
2	66370	.05213	33.6	.2576	.3826	210	260	3003	1670
3	52640	.04134	26.7	.2294	.3544	159	199	2439	1325
4	41740	.03278	21.2	.2043	.3293	126	164	1970	1050
5	33100	.02600	16.8	.1819	.3069	100	135	1591	880
6	26250	.02062	13.3	.1620	.2870	79	112	1280	700
7	20870	.016335	10.6	.1443	.2693	63	...	1030	550
8	16510	.01297	8.37	.1285	.2535	50	75	826	440

## Solid Copper Wire - Bare and Insulated

Size A.W.G.	Section Area			No. of Wires in Strand	Diameter Overall		Weight Pounds per 1000 feet		Breaking Strength Pounds Bare Wire		Resistance OHMs per 1000 Ft. at 20°C (85°F). Standard Annealed
	Circular Mils	Square Inches	Square Millimeter		Bare	Weatherproof (minmium)	Bare	T.B.W.	Hard Drawn	Soft (Minimum)	
	2000000	1.571	1014	91	1.630	1.880	6175	7008	87790	43830	.005289
	1750000	1.374	887	91	1.526	1.776	5403	6193	77930	38350	.006045
	1500000	1.178	760	61	1.411	1.661	4631	5380	65840	32870	.007052
	1250000	.9817	633	61	1.288	1.538	3859	4508	55670	27390	.008463
	1000000	.7854	507	61	1.152	1.402	3088	3674	45030	21910	.010578
	900000	.7069	456	61	1.094	1.313	2779	3332	40520	19720	.011753
	800000	.6283	405	61	1.031	1.250	2470	2992	36020	17530	.013223
	750000	.5890	380	61	.998	1.217	2316	2822	34090	16430	.014104
	700000	.5498	355	61	.964	1.183	2161	2650	31820	15340	.015112
	600000	.4712	304	37	.893	1.112	1853	2235	27020	13150	.017631
	500000	.3927	253	37	.813	1.001	1544	1894	22510	10960	.021157
	450000	.3534	228	37	.772	.960	1389	1724	20450	9860	.023508
	400000	.3142	203	19	.726	.914	1235	1553	17560	8765	.026447
	350000	.2749	177	19	.679	.867	1081	1345	15590	7669	.030225
	300000	.2356	152	19	.629	.817	926	1174	13510	6574	.035262
	250000	.1963	127	7	.574	.762	772	985	11260	5478	.042315
0000	211600	.1662	107	19 or 7*	.528	.684	653	800	9617	4637	.04999
000	167800	.1318	85	19 or 7*	.470	.626	518	653	7366	3677	.06304
00	133100	.1045	67.4	7	.414	.570	411	522	5926	2916	.07949
0	105500	.08289	53.5	7	.368	.524	326	424	4752	2312	.10024
1	83690	.06573	42.4	7	.328	.484	258	328	3804	1834	.1264
2	66370	.05213	33.6	7	.292	.417	205	270	3045	1525	.1594
3	52640	.04134	26.7	7	.260	.385	163	206	2433	1209	.2009
4	41740	.03278	21.2	7	.232	.357	129	170	1938	959	.2535
5	33100	.02600	16.8	7	.206	.331	102	140	1542	761	.3195
6	26250	.02062	13.3	7	.184	.309	81	115	1228	603	.4029
7	....	...	....	.	....	....	..	...	....	....	.5080
8	16510	.01297	8.37	7	.146	.271	51	78	777	379	.6406

\* Sizes A.W.G. 0000 and 000 cable are usually made of 7 strands when bare and 19 strands when insulated.